

5 We claim:

1. In a vertical coal pulverizer having a discharge turret and plurality of pulverized coal outlet pipes in said discharge turret, a device for balancing and controlling the distribution of pulverized coal into the plurality of outlet pipes comprising:

10 a plurality of adjustable flow control elements positioned within said discharge turret of said pulverizer, each of said plurality of flow control elements corresponding to one of said plurality of outlet pipes and being spaced there from,
a corresponding plurality of adjustment mechanisms for each of said plurality of flow control elements for adjusting the position of the flow control element relative to said
15 corresponding outlet pipe.

2. The device for balancing and controlling the distribution of pulverized coal into the plurality of outlet pipes of Claim 1, wherein the shape of each flow control element is aerodynamic to induce a wide coal particle concentration wake and a narrow primary air flow
20 wake relative to said coal particle concentration wake.

3. The device for balancing and controlling the distribution of pulverized coal into the plurality of outlet pipes of Claim 2, wherein said plurality of flow control elements are each positioned an equal predetermined distance upstream of the entrance to said outlet pipes.

25

4. The device for balancing and controlling the distribution of pulverized coal into

5 the plurality of outlet pipes of Claim 3, wherein said predetermined distance comprises a function of the diameter of said outlet pipes and the structure and configuration of said pulverizer including the number of outlet pipes.

5. The device for balancing and controlling the distribution of pulverized coal into
10 the plurality of outlet pipes of Claim 2, wherein said each of said aerodynamic flow control elements comprises a convex rounded windward end, smooth tapering sides and a pointed leeward end.

6. The device for balancing and controlling the distribution of pulverized coal into
15 the plurality of outlet pipes of Claim 5, wherein the convex rounded windward end has a diameter that is a function of the diameter of said outlet pipes and the structure and configuration of said pulverizer including the number of outlet pipes.

7. The device for balancing and controlling the distribution of pulverized coal into
20 the plurality of outlet pipes of Claim 6, wherein said flow control elements have a length that is a function of the diameter of said outlet pipes and the structure and configuration of said pulverizer including the number of outlet pipes.

8. The device for balancing and controlling the distribution of pulverized coal into
25 the plurality of outlet pipes of Claim 1, wherein each of said flow control elements is mounted on and supported by said corresponding adjustment mechanism, and said corresponding adjustment

5 mechanism allows for independent adjustments of the position of each flow control element
relative to the center point of said corresponding outlet pipe in order to selectively vary the
particle concentration wake to alter the concentration of the pulverized coal flow into the
corresponding outlet pipe, the closer the flow control element is to being aligned with the center
point of the outlet pipe, the lesser the concentration of the pulverized coal flowing into the outlet
10 pipe.

9. The device for balancing and controlling the distribution of pulverized coal into the
plurality of outlet pipes of Claim 8, wherein each of the plurality of adjustable flow control
elements is pre-positioned inside said discharge turret of said pulverizer at said predetermined
15 distance upstream of the entrance to said outlet pipes allowing a free flow of pulverized coal into
the outlet pipes; and wherein the position of each of the plurality of adjustable flow control
elements may be adjusted from said preposition using said adjustment mechanism.

10. The device for balancing and controlling the distribution of pulverized coal into the
plurality of outlet pipes of Claim 9, wherein said adjustment mechanism is accessible on-line
20 from outside said pulverizer.

11. The device for balancing and controlling distribution of pulverized coal into the
plurality of outlet pipes of Claim 10, wherein each adjustment mechanism is comprised of a
25 support rod attached to a corresponding flow control element; each of said support rods is further
mounted in a sealed bushing in the discharge turret such that each rod is accessible on-line from

5 outside said pulverizer and may be rotated or slid back and forth within its bushing to adjust the position of the attached flow control element relative its corresponding outlet pipe.

12. The device for balancing distribution of coal among the outlet pipes according to
claim 1, further comprising a plurality of orifice flow restrictors each located in a corresponding
10 outlet pipe.

13. The device for balancing and controlling distribution of pulverized coal into the
plurality of outlet pipes of Claim 1, wherein said pulverizer is a pressurized vertical spindle
pulverizer with four pulverized coal outlet pipes, the diameter of the convex rounded windward
15 end of said flow control elements is approximately equal to one-quarter the diameter of said
pulverized coal outlet pipes, the length of said flow control elements is approximately equal to
one half the diameter of the pulverized coal outlet pipes and the distance between the entrance to
each of the four outlet pipes and its corresponding flow control element is optimal at
approximately two times the outlet pipe diameter.

20

14. The device for balancing and controlling distribution of pulverized coal into the
plurality of outlet pipes of Claim 1, wherein said device is adapted for after-market installation.

15. In a vertical coal pulverizer that produces pulverized coal for use as boiler fuel of a
25 type having a raw coal inlet port and chute, a coal grinding mechanism, primary air flow as a
means for transporting pulverized coal, a discharge turret and a plurality of pulverized coal outlet

5 pipes of equal diameter, a method for balancing and controlling the distribution of pulverized
coal into the plurality of outlet pipes and thereby improving boiler performance; said method
comprising the steps of: monitoring distribution of pulverized coal flow into each of said outlet
pipes relative to primary air flow; and compensating for imbalances in said pulverized coal flow
into said outlet pipes by positioning flow control elements corresponding to each outlet pipe a
10 predetermined distance upstream from said outlet pipes and selectively adjusting the individual
flow elements on-line in order to alter the rate of pulverized coal flow into said corresponding
outlet pipes.

16. The method of claim 15, wherein the step of monitoring distribution of pulverized
15 coal flow into each of said outlet pipes relative to a primary air flow is accomplished by
measuring a concentration of pulverized coal flow at the individual pulverized coal outlet pipes.

17. The method of claim 15, wherein the step of monitoring distribution of pulverized
coal flow into each of said outlet pipes relative to primary air flow is accomplished by measuring
20 particular flame characteristics of burning fuel discharged from the each of the outlet pipes.

18. The method of claim 15, wherein adjusting a flow control element is accomplished by
selectively changing the position of the flow control element relative to the center point of the
entrance to its corresponding outlet pipe, the closer the flow control element is to being aligned
25 with the center point of the outlet pipe, the lesser the concentration of the pulverized coal
flowing into the outlet pipe.